CLAIMS

What is claimed is:

1.   A network for interconnecting devices external to the network, comprising:

          a plurality of switching nodes interconnected by links forming a

5   Gamma graph interconnection network; and

          a plurality of devices coupled to the network via a plurality of

ports.

2.   The network of claim 1, further comprising:

          a plurality of buses, each switching node coupled to at least one

10   of the plurality of buses, each bus capable of supporting a configurable

number of ports, the bandwidth of a port being inversely proportional to

the number of ports configured per bus.

3.   The network of claim 1, wherein

          the Gamma graph interconnection network has a diameter (D)

15   and a radix (Δ), the radix greater than the diameter;

          the interconnection network being link fault tolerant by providing

Δ-1 alternative paths between any two devices, packets alternatively

routed between at least two devices over one of the Δ-1 paths through the

20   interconnection network having a hop distance greater than the diameter.

4.   The network of claim 1, wherein each switching node is interconnected to a

subset of adjacent switching nodes, each switching node having a bidirectional

interconnection with one of the adjacent switching nodes with the remaining

interconnections being primarily unidirectional.

5.   The network of claim 1, wherein the Gamma graph interconnection network having a radix equal to 8 and a diameter equal to 4 comprises:

        3024 interconnected switching nodes;

        at least 24 devices coupled to each switching node via ports; and

        at least 2 logical data channels supported per port, each channel having a bandwidth of at least 2 gigabits per second.

6.   The network of claim 5, wherein the Gamma graph interconnection network provides a total bandwidth of at least 290 terabits per second.

7.   The network of claim 1, wherein the Gamma graph interconnection network comprises:

        six or more interconnected switching nodes;

        at least one device coupled to each switching node via ports; and

        at least one logical data channel supported per port.

8.   The network of claim 2, wherein each switching node comprises:

        a switch;

        at least one traffic manager coupled to the switch;

        the traffic manager receiving data packets from one or more devices and forwarding at least portions of the packets into the interconnection network, the traffic manager buffering data packets in memory coupled to the traffic manager, the traffic manager receiving at least portions of data packets from the switch and forwarding the data packets out of the interconnection network to the one or more devices;

        the switch coupled to switches of adjacent switching nodes by links fanning in and out of the switch according to a set of Gamma graph adjacency rules, the switch forwarding at least portions of data packets to

the at least one traffic manager or to switches of adjacent switching
nodes.

9.   The network of claim 8, wherein each of the plurality of buses are coupled to the
switching nodes by a traffic manager, the traffic manager transporting data

5   packets from the one or more devices.

10.   The network of claim 9, further comprising
at least one application specific module (ASM) providing an
interface between at least one device and the switching node, the ASM
transporting data packets from the at least one device to the bus.

10 11.   The network of claim 2, wherein the plurality of buses are Infiniband™ buses.

12.   The network of claim 2, wherein the plurality of buses are capable of supporting
one or more logical data channels per port configured.

13.   The network of claim 12, wherein the one or more logical data channels are
Infiniband™ lanes.

15 14.   The network of claim 10, wherein the application specific module couples to a
device providing data, data processing, or data storage.

15.   The network of claim 10, wherein the application specific module (ASM) is a
network interface card.

16.   The network of claim 15, wherein the network interface card is an Ethernet
20   network interface card.

17.   The network of claim 15, wherein the network interface card is an ATM network interface card.

18.   The network of claim 10, wherein the application specific module (ASM) is a processor module.

5   19.   The network of claim 10, wherein the application specific module (ASM) is a WAN interface card.

20.   The network of claim 10, wherein the application specific module (ASM) is a POS interface card.

21.   The network of claim 10, wherein the application specific module (ASM) is an
10   Infiniband™ interface card.

22.   A network for interconnecting devices external to the network, comprising:

        a plurality of switching nodes interconnected by links forming an interconnection network having a diameter (D) and a radix (Δ), the radix greater than the diameter;

15   a plurality of devices coupled to the network via ports; and

        the interconnection network being link fault tolerant by providing Δ-1 alternative paths between any two devices, packets alternatively routed between at least two devices over one of the Δ-1 paths through the interconnection network having a hop distance greater than the diameter;

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23.   A network for interconnecting devices external to the network, comprising:

        a plurality of switching nodes interconnected by links forming an interconnection network, each switching node interconnected to a subset

of adjacent switching nodes, each switching node having a bidirectional

interconnection with one of the adjacent switching nodes with the

remaining interconnections being primarily unidirectional;

     a plurality of devices coupled to the network via ports; and

5   packets routed among the plurality of devices by traversing one or

more hops across the links.

24.   A network for interconnecting devices, comprising:

     a plurality of switching nodes interconnected by links, the

interconnection network capable of forming a Gamma graph

10   interconnection network;

     a plurality of devices coupled to the network via ports; and

     packets routed among the plurality of devices by traversing one or

more hops across the links.